National Institute of Environmental Health Sciences

Dynamics and predictive modelling of Vibrio spp. in the Neuse River Estuary, North Carolina, USA

Author(s): Hsieh JL, Fries JS, Noble RT
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Abstract:

Vibrio spp. are naturally occurring bacteria in marine and estuarine environments around the world. The genus includes several human and animal pathogens that can negatively impact human health, seafood and aquaculture. Vibrio spp. populations are capable of rapid adaptation in response to changing environmental conditions, making them dynamic over short-term and seasonal scales. Temperature, vertical mixing, tidal flushing, climate, precipitation and nutrient loading can change the estuarine environment and subsequently alter microbial community structure, including Vibrio spp., affecting estuarine water quality and public health. To describe these dynamics, Vibrio spp. concentrations and a range of microbial, physical and chemical measures were monitored every 2 weeks and after storm events for 19 months in the Neuse River Estuary (NRE). Results showed clear seasonal and geographic trends in Vibrio spp. abundance. Multiple regression analysis revealed a strong relationship to temperature and salinity, with additional minor influences of chlorophyll a and dissolved organic carbon. Similar models based on easily measured environmental parameters should be pursued for individual Vibrio species in the NRE and other estuarine environments. Predictive models provide useful information for managers, researchers and modellers of estuarine ecosystems.

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Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Researcher

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Temperature

Geographic Feature: ☑

resource focuses on specific type of geography

Freshwater

Geographic Location: ☑

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Foodborne/Waterborne Disease

Foodborne/Waterborne Disease: Vibrioses

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content